

## REMARKS

Claims 1-3 and 5-7 are pending in the application, with Claims 1, 5 and 6 being in independent form. The Examiner rejected Claims 1-3 and 5 under 35 U.S.C. §101 as being directed to non-statutory subject matter. The Examiner has rejected Claims 1, 3, 6 and 7 under 35 U.S.C. §103(a) as being unpatentable over Eroz et al. (U.S. Patent 6,370,669) in view of Gibbs et al. (U.S. Patent 6,711,182). The Examiner has rejected Claims 2 and 5 under 35 U.S.C. §103(a) as being unpatentable over Eroz et al. and Gibbs et al. in view of Moulsey (U.S. Patent 6,671,851).

The Examiner rejected Claims 1-3 and 5 under 35 U.S.C. §101 as being directed to non-statutory subject matter. Since the pending claims were already amended to clarify that the present invention is neither an abstract algorithm nor a mere computer program, but a computer program device readable by a machine, it is respectfully submitted that the claim rejections under 35 USC §101 are improper. Also, Claims 1-3 and 5 are related to the generation of sub-codes prior to transmission. Based on at least the foregoing, withdrawal of the rejection of Claims 1-3 and 5 under 35 U.S.C. §101 is respectfully requested.

Initially, regarding the rejections under 35 USC §103(a), a brief overview of certain distinctions is provided. Eroz discloses two sets of 1/3 rate turbo codes and 1/2 rate turbo codes in FIG. 16. Although Eroz teaches a puncturing pattern for puncturing encoded bits in encoders, the sub-code of the present invention is directed to a queue indicating punctured or repeated positions. The Examiner points out that Eroz fails to disclose the rearranging step of the present invention, but that such a step is taught by Gibbs. However, Gibbs merely discloses classifying and mapping data included in a data structure itself, not rearranging the order of codes. Herein, none of Eroz and Gibbs discloses the concept of one sub-code set which are sub-codes having a code rate to be used after using the sub-code having a predetermined code rate.

Regarding the rejection of independent Claim 1, the Examiner states that Eroz et al. in view of Gibbs et al. renders the claim unpatentable. Eroz et al. discloses sets of rate-compatible

universal turbo codes nearly optimized over various rates and interleaver sizes; and, Gibbs et al. discloses a method and apparatus for processing data from multiple sources. The Examiner states that Eroz et al. teaches generating sub-code sets with given code rates, each sub-code belonging to one sub-code set having the same code rate and each sub-code set having a different code rate, as recited in Claim 1. The Examiner cites Fig. 16 (depicting puncturing patterns, not turbo codes) as partial support. The Examiner goes on to state that Gibbs et al. teaches rearranging an order of the sub-codes of a sub-code set with a same or different code rate that is to be used after a sub-code with a predetermined code rate according to a priority of the sub-codes.

First, Gibbs et al. deals with forward error correction, and nothing in Eroz et al. would ever suggest using processes dealing with forward error correction in its turbo encoder. Second, Gibbs et al. does not rearrange any codes, nor does Gibbs et al. rearrange any sub-codes. Third, the rearranging of Claim 1 is performed according to a priority of the sub-codes; Gibbs et al. teaches prioritizing segments of a data stream, not codes. Finally, Eroz et al. in Fig. 16 deals with puncturing patterns, not any codes themselves. Based on at least the foregoing, withdrawal of the rejection of Claim 1 is respectfully requested.

Regarding the rejection of independent Claim 6, the Examiner states that Eroz et al. in view of Gibbs et al. renders the claims unpatentable. The Examiner merely repeats the statements presented in the rejection of Claim 1, verbatim, even though Claim 6 recites different elements. Claim 6 recites “generating sub-code sets with given code rates; rearranging an order of the sub-codes in the sub-code sets according to a priority of the sub-codes and storing the rearranged sub-codes; selecting a sub-code set with a code rate determined for transmission; and transmitting data using a sub-code in the selected sub-code set.” None of these elements are discussed in the rejection of Claim 6 on pages 5 – 7 of the Office Action. Based on at least the foregoing, withdrawal of the rejection of independent Claim 6 is respectfully requested.

Regarding the rejection of independent Claim 5, the Examiner states that Eroz et al. and Gibbs et al. in view of Mousley render the claim unpatentable. Mousley discloses a coding device and communication system using the same.

The Examiner states that Eroz et al. teaches generating sub-code sets with given code rates, each sub-code belonging to one sub-code set having the same code rate and each sub-code set having a different code rate. However, this is not recited in Claim 5, and therefore the Examiner's analysis must fail.

The Examiner goes on to state that Gibbs et al. teaches rearranging an order of the sub-codes of a sub-code set with a same or different code rate that is to be used after a sub-code with a predetermined code rate according to a priority of the sub-codes; but again, this is not recited in Claim 5. Again the Examiner's analysis must fail.

Further, the element of Claim 5 that recites "generating sub-code sets corresponding to a plurality of system code rates, each sub-code of the sub-code set represented in a matrix format with elements representing repetition and puncturing positions" is never addressed in the rejection of Claim 5 on pages 9 – 11 of the Office Action.

Based on at least the foregoing, withdrawal of the rejection of Claim 5 is respectfully requested.

Applicants respectfully submit the following reply to statements contained in the Office Action.

The Examiner states that Eroz et al. discloses "generating new sub-code sets, a matrix of each sub-code in a new sub-code set having as many columns as a least common multiple of the numbers of columns of sub-codes in the sub-code sets", and cites Fig. 16 as support. Although Fig. 16 of Eroz et al. discloses several patterns sets, Eroz et al. does not disclose generating sub-code sets and new sub-code sets.

The Examiner states that Eroz et al. discloses "determining priority of the matrixes of sub-codes in each new sub-code set so that a matrix generated by combining matrixes from two

of the new sub-code sets has a quasi-complementary turbo code (QCTC) characteristic”, and cites col. 11, lines 1-20 in support. This section of Eroz et al. teaches producing turbo codes by combining three code triads with four puncturing patterns, and in no way relates or teaches determining priorities of matrixes of sub-codes. Nor does this section of Eroz et al. teach combining two matrixes to generate a matrix.

Further, col. 11, lines 1-20, of Eroz et al. does not teach that the generated matrix has a quasi-complementary turbo code (QCTC) characteristic, which the Examiner, mistakenly, but summarily dismisses by stating that “all of the codes in Figure 16 of Eroz are complementary; hence Quasi-complementary”. However, Fig. 16 depicts puncturing patterns, not codes, and by definition, puncturing patterns are not defined as being complementary, let alone quasi-complementary. Further, the term “quasi-complementary”, in this and other patents and applications, is defined as follows:

A quasi-complementary turbo code (QCTC) is a code produced in an apparatus that includes a turbo encoder for generating information symbols and first and second parity symbols from an information bit stream, and a sub-code generator for generating sub-codes from the information symbols and the first and second parity symbols using puncturing matrices. The sub-code generator selects a number of information symbols equal to a number of columns in the initial puncturing matrix from the information symbols output from the turbo encoder, if a difference between the number Ns of selected symbols in the initial puncturing matrix and the number of the columns in the initial puncturing matrix is equal to or greater than a number of component encoders in the turbo encoder, and selects a number of first and second parity symbols equal to the difference. The QCTC is referred to as being “quasi-complementary” because the codes are not strictly complementary since repeated symbols do exist, but each sub-code exhibits a unique characteristic that enables the sub-codes to be distinguished from each other even though they are not complementary.

Therefore, complementary codes are not quasi-complementary. And further, the Examiner is applying his mistaken quasi-complementary definition to the original turbo codes of Eroz et al. and not “determining priority of the matrixes of sub-codes in each new sub-code set so that a matrix generated by combining matrixes from two of the new sub-code sets has a quasi-complementary turbo code (QCTC) characteristic” as recited in Claim 1.

The Examiner states that Eroz et al. discloses “a higher priority assigned to a more desirable QCTC characteristic”, and cites col. 11, lines 1-20 in support. The turbo code selection of Eroz et al. is based on simulation results (col. 11, lines 9-10). This cannot be equated with assigning priorities such that a higher priority is assigned to a more desirable QCTC characteristic as recited in Claim 1.

The Examiner states that Eroz et al. discloses “wherein the QCTC characteristic are the elements of the matrix that have a uniform distribution of repetition and puncturing”, and again cites Fig 16 in support. The Examiner states “the matrices in Figure 16 of Eroz provide for uniform distribution.” This statement is not taught by Eroz et al. As a matter of fact, Eroz et al. at col. 12, lines 1-17 states that Fig. 16 illustrates puncturing patterns used to produce turbo codes. The puncturing patterns of Fig. 16 are not sub-code matrixes and therefore cannot be used to determine that the QCTC characteristic are the elements of the matrix that have a uniform distribution of repetition and puncturing as recited in Claim 5.

The Examiner states that Eroz et al. discloses “rearranging the matrixes in each new sub-code according to the priority”, and yet again cites Fig 16 in support. Puncturing takes place in Eroz et al., not rearranging. Eroz et al. does not teach rearranging the matrixes in each new sub-code according to the priority.

Finally, the Examiner states “Eroz et al. and Gibbs et al. does not explicitly teach the specific use of repetition”, and goes on to state “Moulsley, in analogous art, teaches use of repetition or puncturing matrices for generating the repetition or punctured sub-codes taught in Park”, and cites Fig. 2 of Moulsley. Park is no longer an applied reference; this creates an error in the Office Action that must cause the rejection to fail.

Independent Claims 1, 5 and 6 are believed to be in condition for allowance. Without conceding the patentability per se of dependent Claims 2, 3 and 7, these are likewise believed to be allowable by virtue of their dependence on their respective amended independent claims.

Accordingly, reconsideration and withdrawal of the rejections of dependent Claims 2, 3 and 7 is respectfully requested.

Accordingly, all of the claims pending in the Application, namely, Claims 1-3 and 5-7, are believed to be in condition for allowance. Should the Examiner believe that a telephone conference or personal interview would facilitate resolution of any remaining matters, the Examiner may contact Applicant's attorney at the number given below.

Respectfully submitted,



Paul J. Farrell  
Reg. No. 33,494  
Attorney for Applicant

DILWORTH & BARRESE  
333 Earle Ovington Blvd.  
Uniondale, New York 11553  
Tel: (516) 228-8484  
Fax: (516) 228-8516